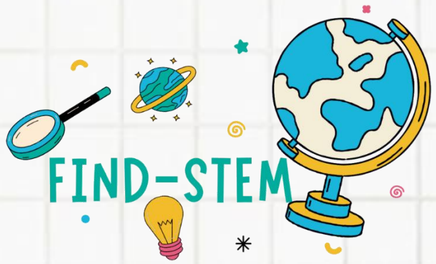

Module 1:

Introduction to STEM Education

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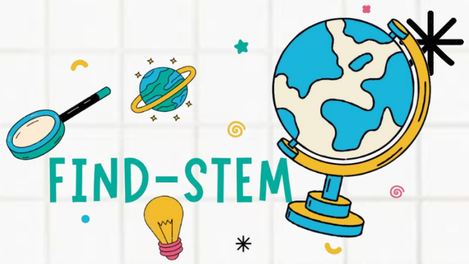
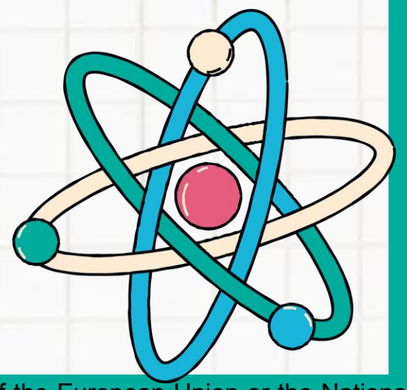


INTRODUCTION

This introductory module provides an overview of STEM (Science, Technology, Engineering, and Mathematics) education, emphasizing its significance in fostering critical thinking, creativity, and problem-solving skills. It explores the integration of creative and innovative methodologies to enhance pupil engagement and improve learning outcomes in STEM disciplines.



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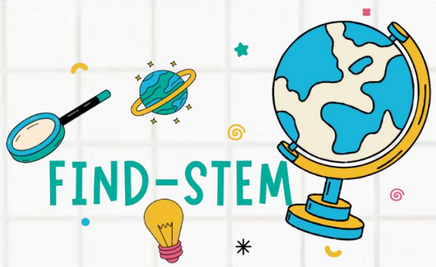
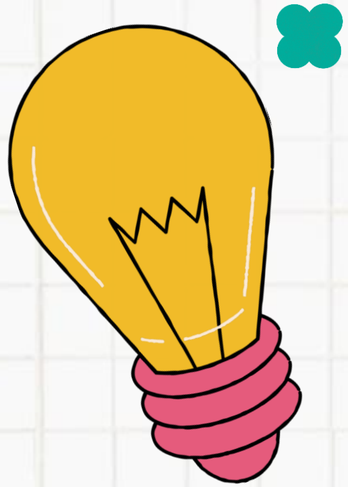


KEY TOPICS



01

Overview of STEM Education

02

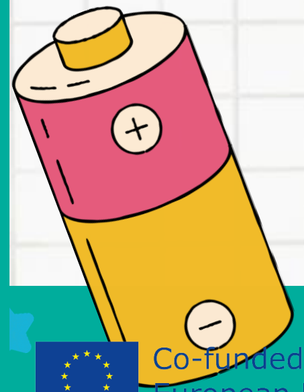
The importance of STEM in developing critical thinking, creativity, and problem-solving

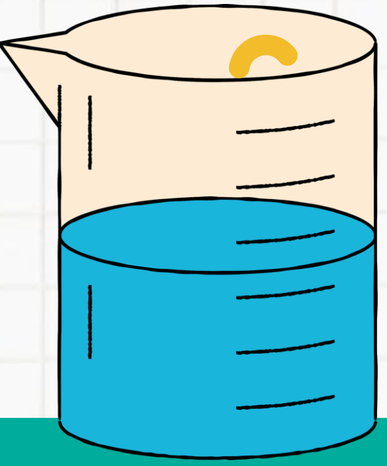
03

The impact of creative methodologies on pupil engagement and academic achievement

04

Identifying barriers and opportunities within STEM education





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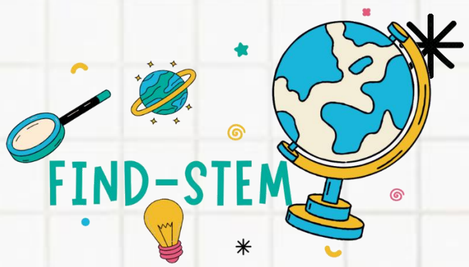

GENERAL LEARNING OUTCOMES

- Understand the fundamental principles and objectives of STEM education.
- Recognize the role of STEM in developing critical thinking, creativity, and problem-solving skills.
- Analyse the impact of creative approaches on pupil engagement, motivation, and academic performance.
- Identify barriers and opportunities in STEM education and how innovative teaching methods can address them.

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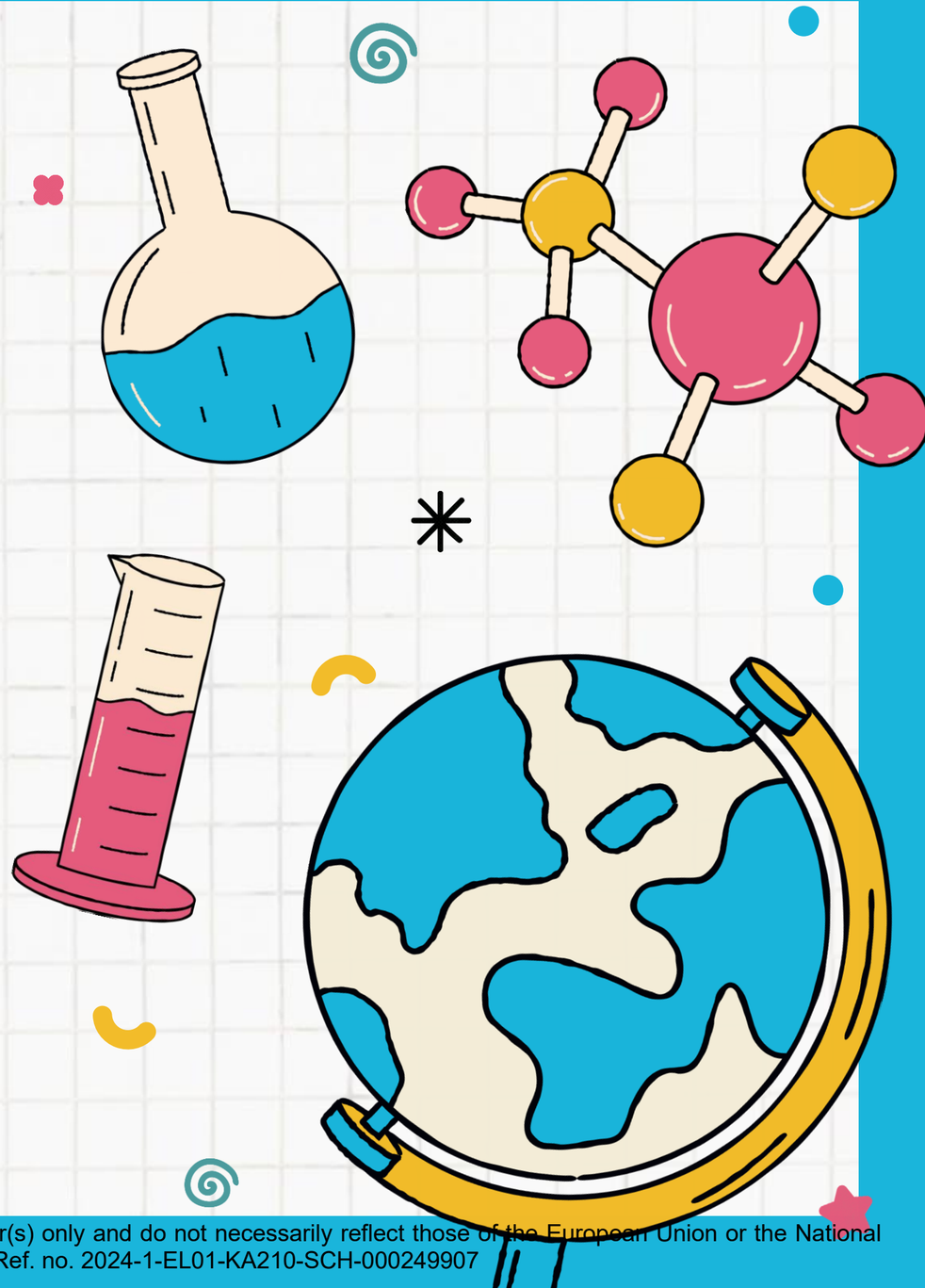
FIND-STEM

ACTIVITY 1

Exploring STEM through Packaging Design



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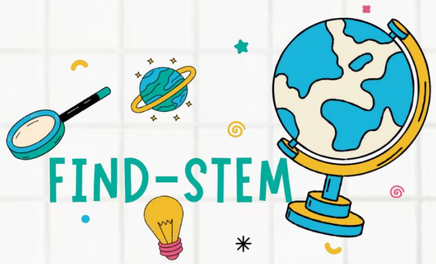
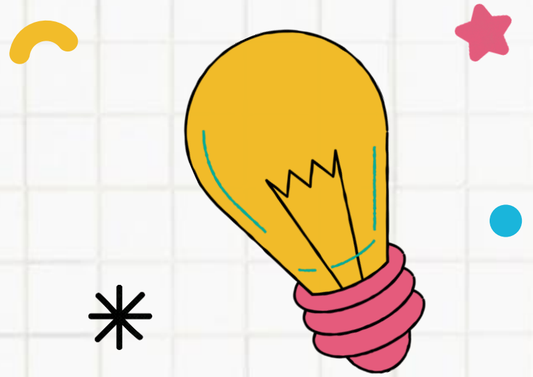


OBJECTIVES



1

Connect personal experiences to STEM thinking

2

Explore STEM/STEAM principles through real-world packaging

3

Understand the foundation and significance of STEM education

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Icebreaker Activity: Think Like a Child

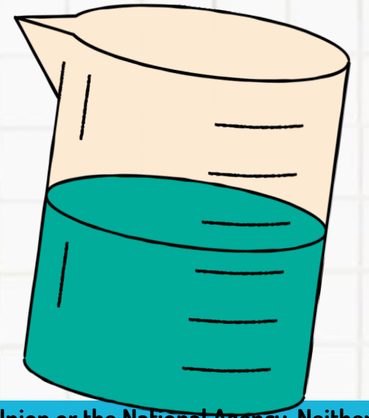
DISCUSSION:

What did you build, invent, or solve as a child?

EXAMPLES

Shelter house, paper airplane, sandcastle, dollhouse

Share with your group! (3 minutes each)



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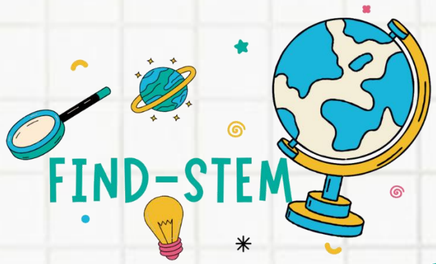
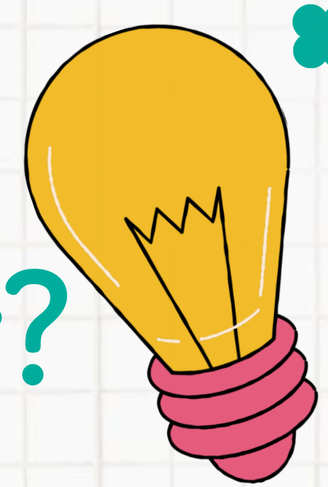


What Does STEM Stand For?



S - SCIENCE

Science helps us explore and understand the natural world through observation, experimentation, and evidence-based reasoning.

T - TECHNOLOGY

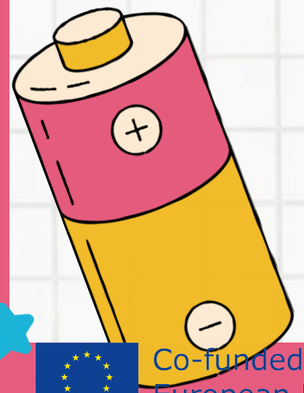
Technology involves the use of scientific knowledge to create tools, systems, and devices that solve problems and improve our lives.

E - ENGINEERING

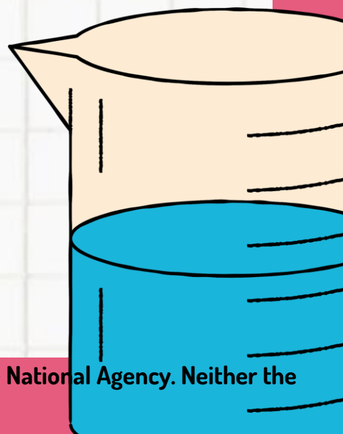
Engineering involves designing, building, and optimizing solutions, structures, and systems by applying science and mathematics to solve real-world problems.

M - MATHEMATICS

Mathematics provides the language and tools for solving problems, analyzing patterns, and making logical decisions across all STEM fields.



Integrated disciplines to solve real-world problems!



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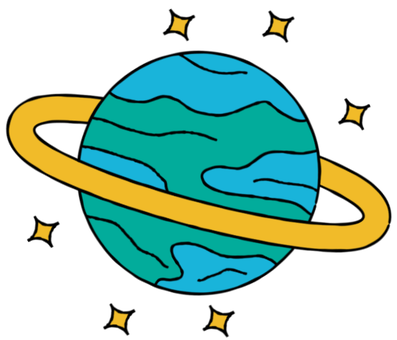
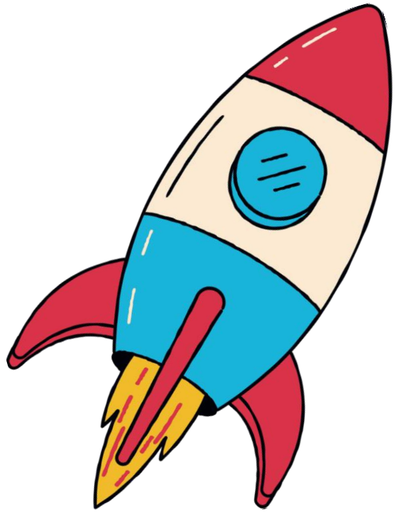
What is the A in STEAM?



A = Arts

Encourages creativity, expression, and innovative thinking



Enhances engagement and inclusivity

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Hands-on STEM: Packaging Design Activity

GOAL

Explore STEM principles in packaging

MATERIALS

Cereal boxes, juice cartons, egg cartons, plastic bottles

INSTRUCTIONS

Examine materials, shape, function

DISCUSS

Links to Science, Tech, Engineering, Math

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Packaging Activity: Guiding Questions

SCIENCE

What materials are used and why?

TECHNOLOGY

How is the packaging made?

ENGINEERING

How does the shape help protect contents and the product storage and delivery?

MATHEMATICS

Is it an efficient use of space/material?

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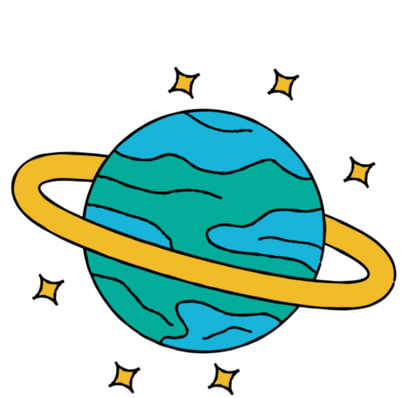
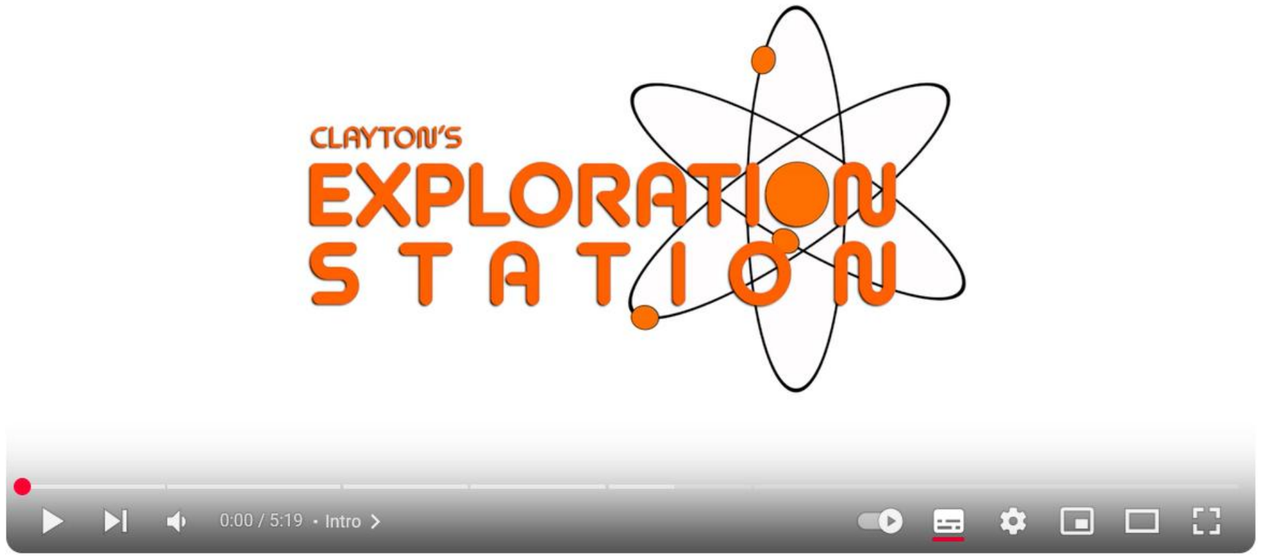
What is STEM education?



Watch the video: 'What is STEM Education' (click on the picture)



Group reflection: How does this align with your teaching values and goals?

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Origins of STEM Education

- Launched post-Sputnik shock (1957)
- Response to boost science & technology education
- Evolution to integrated, inquiry-driven approach

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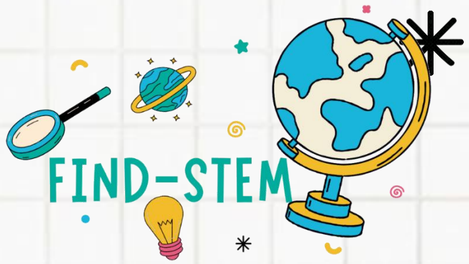

Aims of STEM Education

- Develop problem-solving and innovation skills
- Prepare pupils for future societal and job market needs
- Encourage curiosity, inquiry, and lifelong learning

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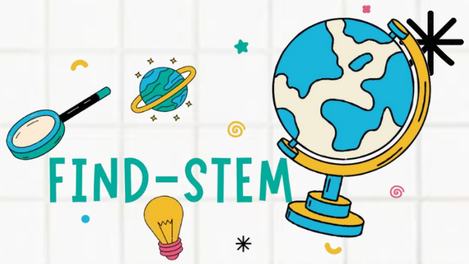

Why is STEM important?

- Responds to skill gaps in literacy, numeracy, and digital literacy
- Emphasizes equity and inclusion in future skills development

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Additional Resources

EU Basic Skills Action Plan:
https://education.ec.europa.eu/sites/default/files/2025-03/Graphic%20version%20Action%20Plan%20on%20Basic%20Skills.pdf

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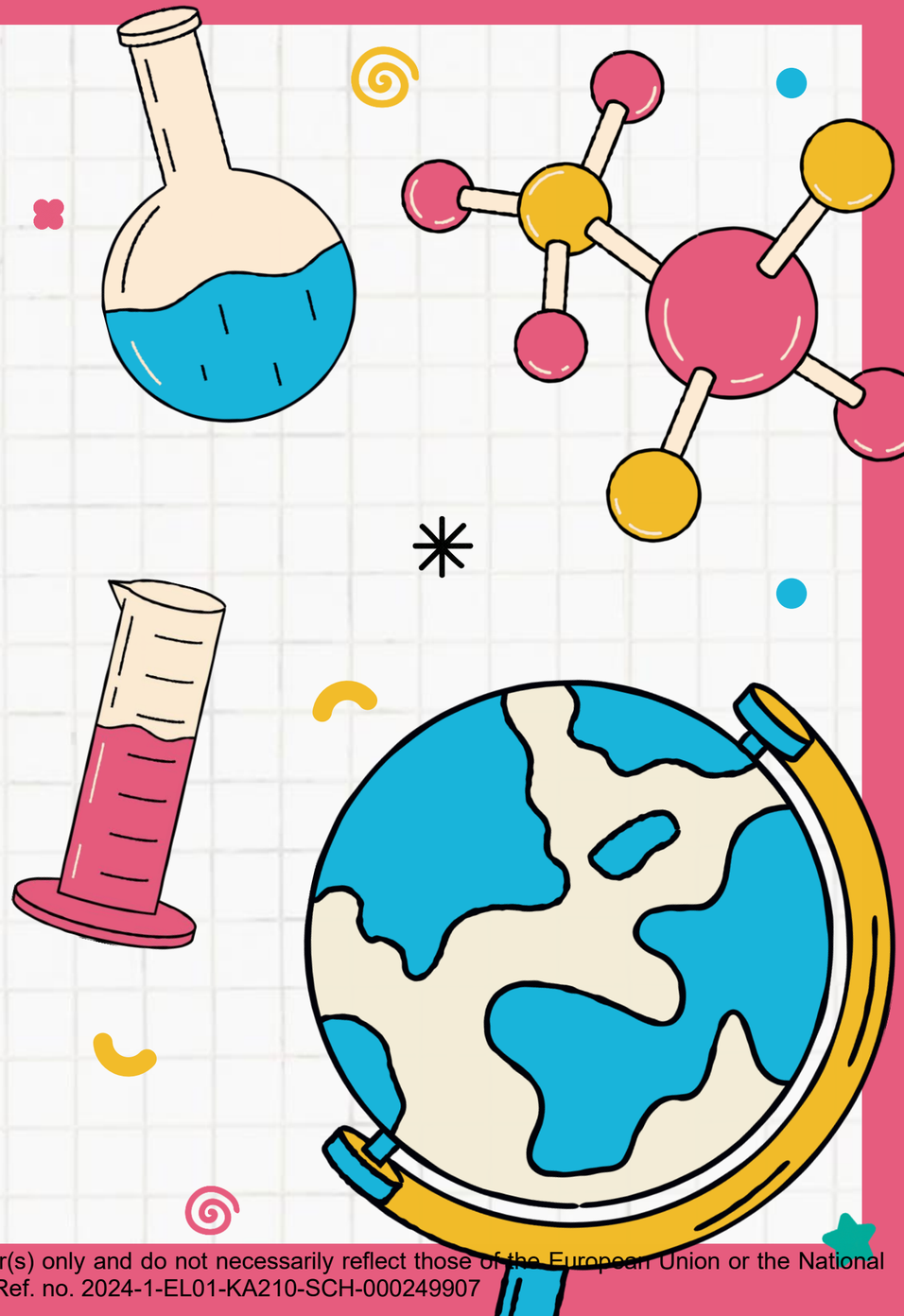
FIND-STEM

ACTIVITY 2

Newspaper Chair Challenge: Engineering with Creativity



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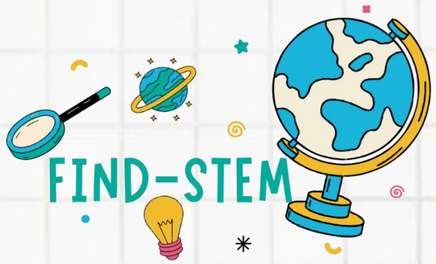
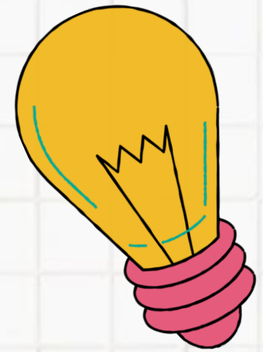


OBJECTIVES



1

Experience the power of hands-on, inquiry-based learning in a collaborative environment

2

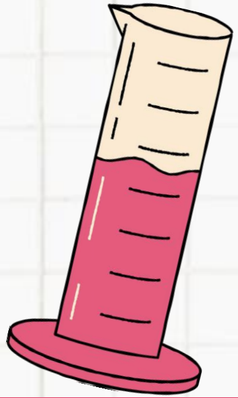
Develop problem-solving, engineering, and creative thinking skills

3

Reflect on how design challenges engage pupils in STEM learning

4

Recognize the value of integrating low-cost materials and playful experimentation in STEM education



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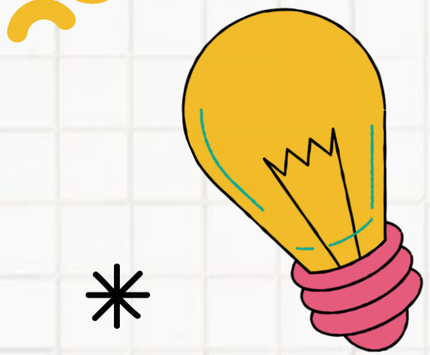
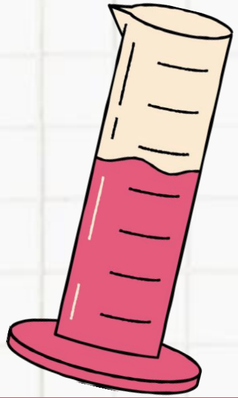
CHALLENGE



"Build a small chair or stool structure using only newspaper and selotape, capable of holding one or two books without collapsing"

You have 30 minutes to complete your design!



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REFLECT

Discuss as a group the design decisions each group followed and classroom potential

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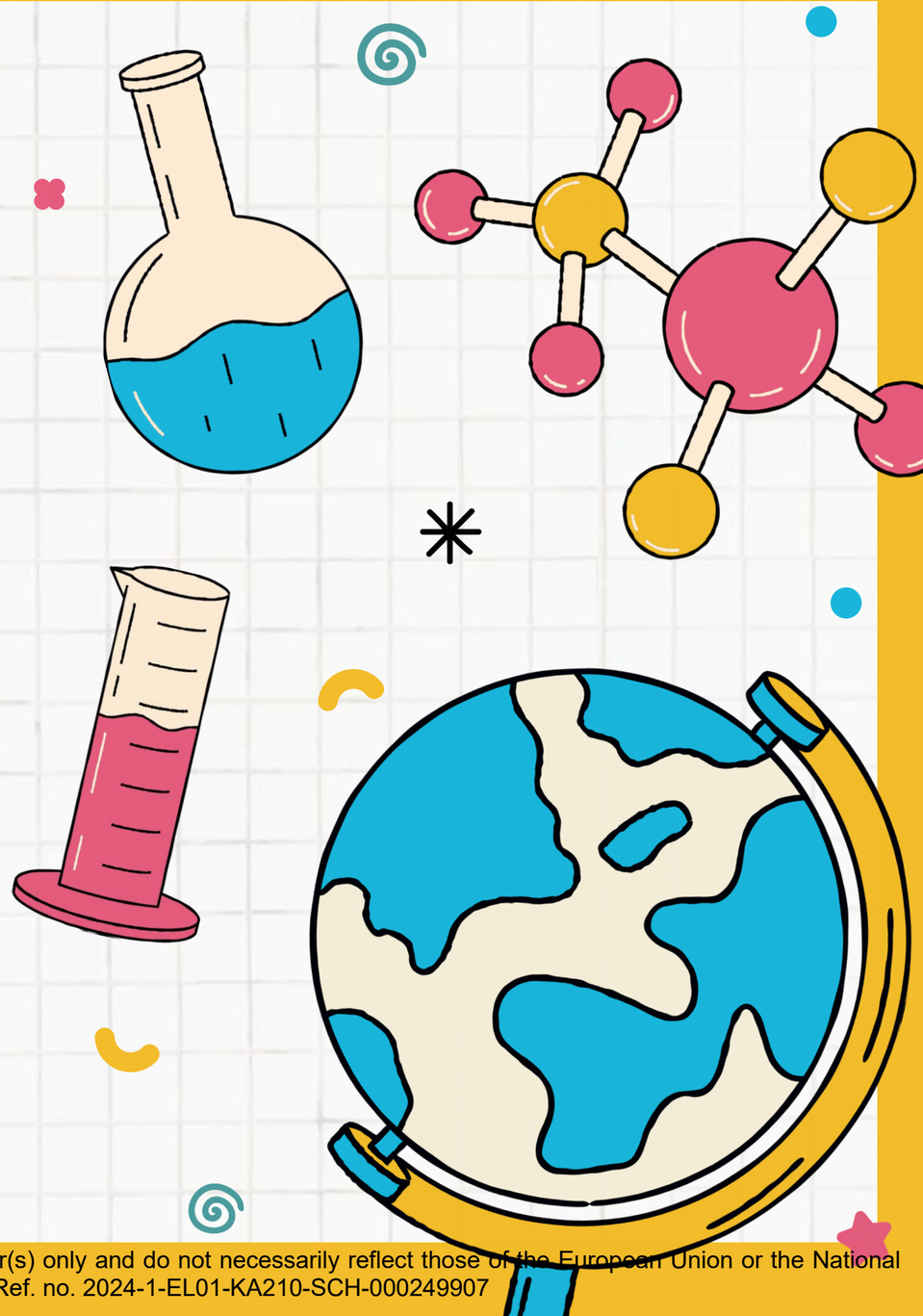
FIND-STEM

ACTIVITY 3

Barrier Busters: Rapid STEM Opportunity Map



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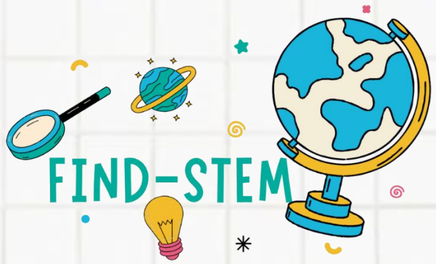
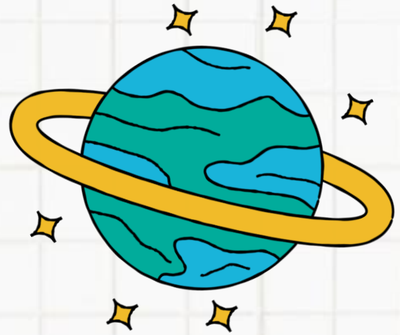


OBJECTIVES



1

Identify the most common classroom-level barriers to effective STEM instruction

2

Generate at least one practical, innovative solution (opportunity) for each barrier using creative teaching methods

3

Recognise how peer exchange can surface unseen challenges and spark collective problem-solving

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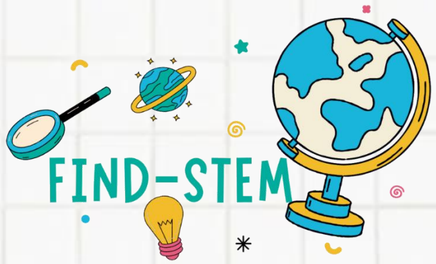
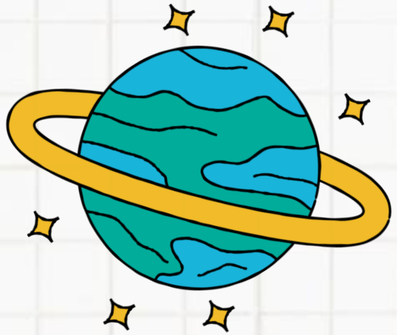


Think!



Each teacher writes one major barrier to creative STEM teaching on a sticky note (e.g., time, resources, stereotypes)

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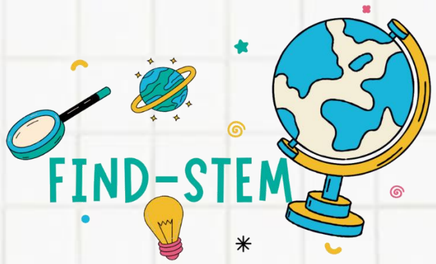
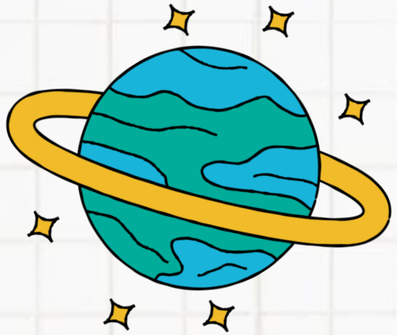


Pair!



In pairs, share barriers and jot a quick solution on the same note

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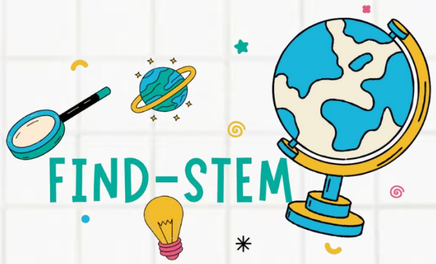
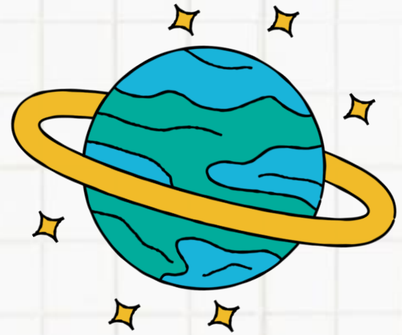


Share and Cluster!



Pairs place their notes on the large flip-chart;

group similar notes into themes

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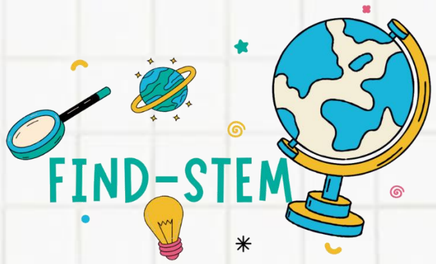
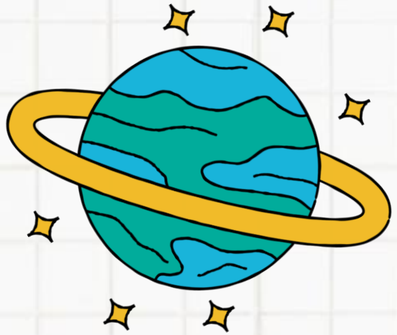


Dot-Vote!



Each teacher participant gets three coloured dots to vote on the most pressing barrier clusters.

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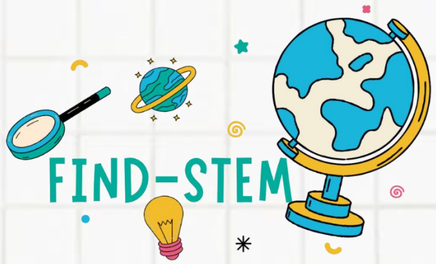
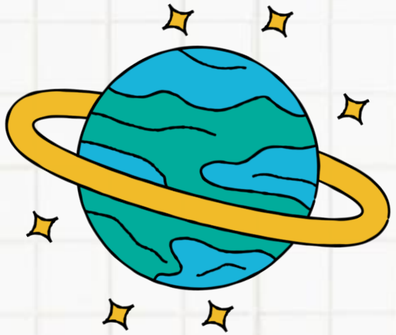


Mini-Pitch !



The pair whose barrier receives the most votes gives a 30-second pitch outlining their proposed solution

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Additional Resources

The Biggest Barriers to STEM Education: https://www.edweek.org/teaching-learning/the-biggest-barriers-to-stem-education-according-to-educators/2024/09

National STEM-learning centers: https://www.stem.org.uk/

Culturally & Gender-Inclusive STEM: https://www.unesco.org/en/basic-sciences-engineering

Low-Cost Makerspaces: https://fabacademy.org/

“MakerEd” certification modules: https://makered.org/

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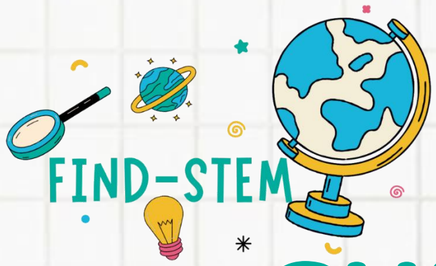

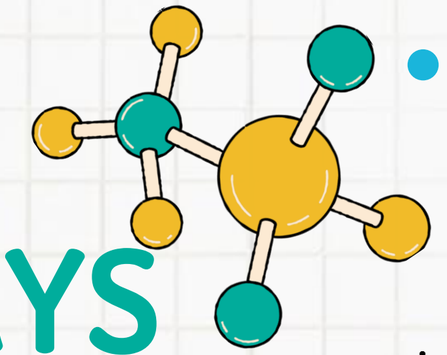

SUMMARY OF KEY TAKEWAYS

1/2

1. STEM is interdisciplinary by nature—science, technology, engineering and mathematics are most impactful when taught as interconnected ways of thinking and problem-solving;

2. Creativity is a catalyst: integrating arts (A) or other creative approaches amplifies engagement, deepens understanding and nurtures innovation;

3. Critical-thinking & problem-solving skills grow when pupils tackle authentic, real-world challenges rather than isolated facts

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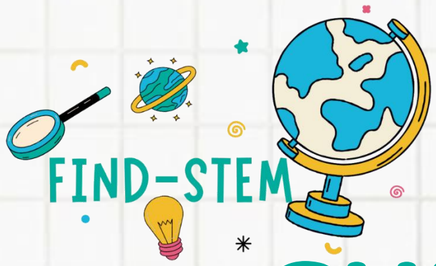

SUMMARY OF KEY TAKEWAYS

2/2

4. Teacher mindset matters: a willingness to experiment, iterate and reflect is the starting point for inspiring pupils to do the same;

5. Barriers are real but surmountable: limited resources, time, gender-equality challenges (e.g., lower participation of girls), or teacher confidence can be mitigated through inclusive strategies, peer collaboration, low-cost materials and iterative design challenges

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End Module1

Any questions? Don't hesitate to ask for our help

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